

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A base station of a mobile communication system ~~which adopts a transmission power control system,~~ comprising:

a communication monitor circuit for detecting quality deterioration of radio communication with mobile stations, wherein:

said communication monitor circuit ~~comprising~~ comprises:

a monitor unit for monitoring a communication state of said radio communication;

a judging unit ~~connected~~ coupled to said monitor unit for judging whether said communication state monitored by said monitor unit is worse than a predetermined state; and

a notifying unit ~~connected~~ coupled to said judging unit for notifying an external circuit of said quality deterioration when said judging unit judges that said communication state is worse than said predetermined state.

2. (currently amended): A base station as claimed in Claim 1, ~~said base station~~ further comprising receivers for demodulating transmission signals transmitted from said mobile stations to produce demodulated signals, wherein:

said monitor unit is ~~connected~~ coupled to said receivers for monitoring total interference electric power of said demodulated signals as said communication state; and

said judging unit ~~judging~~ judges that said communication state is worse than said predetermined state when said total interference electric power is equal to or larger than a predetermined threshold.

3. (currently amended): A base station as claimed in Claim 1, ~~said base station~~ further comprising:

receivers for demodulating transmission signals transmitted from said mobile stations to produce demodulated signals; and

signal-to-noise ratio determining circuits ~~connected~~ coupled to said receivers respectively for determining signal-to-noise ratios of said demodulated signals, wherein:

said monitor unit, ~~is connected~~ coupled to said signal-to-noise ratio determining circuits, ~~for periodically finding an average of~~ monitors said signal-to-noise ratios as said communication state; and

said judging unit ~~judging~~ judges that said communication state is worse than said predetermined state when the number of signal-to-noise ratios, each of which is ~~larger~~ smaller than ~~the average~~ a predetermined value, is equal to or larger than a predetermined threshold.

4. (currently amended): A base station as claimed in Claim 1, ~~said base station~~
further comprising:

receivers for demodulating transmission signals transmitted from said mobile stations to
produce demodulated signals;

signal-to-noise ratio determining circuits ~~connected~~ coupled to said receivers respectively
for determining signal-to-noise ratios of said demodulated signals; and

transmission power control bit generators ~~connected~~ coupled to said signal-to-noise ratio
determining circuits, respectively, for generating transmission power control bit signals based on
~~the basis of~~ said signal-to-noise ratios, wherein:

said monitor unit, ~~is connected~~ coupled to said transmission power control bit generators,
~~for monitoring~~ monitors said transmission power control bit signals as said communication
state; and

said judging unit ~~judging~~ judges that said communication state is worse than said
~~predetermine~~ predetermined state when the number of said transmission power control bit
signals, each of which require an increase of transmission power, is equal to or larger than a
predetermined threshold.

5. (currently amended): A base station as claimed in Claim 1, ~~said base station~~
further comprising:

receivers for demodulating transmission signals transmitted from said mobile stations to
produce demodulated signals, wherein:

said monitor unit, ~~is connected~~ coupled to said receivers, ~~for monitoring~~ monitors total interference electric power of said demodulated signals and the number of said mobile terminals communicating with said base station as said communication state; and

said judging unit ~~judging~~ judges that said communication state is worse than said predetermined state when a changing rate of a ratio of said total interference electric power to the number of said mobile terminals communicating with said base station is equal to or larger than a predetermined threshold.

6. (currently amended): A base station of a mobile communication system ~~which adopts a transmission power control system to control transmission power of mobile stations by use of transmission power control bit signals, said base station including~~ comprising:

receivers for demodulating transmission signals transmitted from ~~said~~ mobile stations to produce demodulated signals;

signal-to-noise ratio determining circuits ~~connected~~ coupled to said receivers, respectively, for determining signal-to-noise ratios of said demodulated signals; ~~and~~

transmission power control bit generators ~~connected~~ coupled to said signal-to-noise ratio determining circuits, respectively, for generating said transmission power control bit signals based on the basis of said signal-to-noise ~~rations~~ ratios; ~~said base station comprising~~;

a communication state monitor circuit ~~connected~~ coupled to said receivers for detecting quality deterioration of a communication state of radio communication between said base station and said mobile stations; and

a transmission power bit adjusting circuit ~~connected~~ coupled to said ~~quality deterioration detector~~ communication state monitor circuit and said transmission power control bit generators for controlling said transmission power control bit signals so as to suppress an increase of transmission power of said mobile stations when said ~~quality deterioration detector~~ communication state monitor circuit detects said quality deterioration.

7. (currently amended): A base station as claimed in Claim 6, wherein said transmission power control bit generators ~~generating~~ generate the transmission power control bit signals which requires an increase of transmission power of said mobile stations when signal-to-noise ratios are equal to or lower than a desired value, ~~wherein;~~ and

said transmission power control bit adjusting ~~unit~~ circuit decreases said desired value to suppress an increase of transmission power of said mobile stations when said ~~quality deterioration detector~~ communication state monitor circuit detects said quality deterioration.

8. (currently amended): A base station as claimed in Claim 6, wherein:

said transmission power control bit adjusting ~~unit~~ circuit changes said transmission power control bit signals so that said transmission power control bit signals require a decrease of said transmission power of said mobile stations.

9. (currently amended): A base station as claimed in Claim 6, wherein said communication state monitor circuit comprises:

a monitor unit for monitoring said communication state of said radio communication;
a judging unit ~~connected~~ coupled to said monitor unit for judging whether said communication state monitored by said monitor unit is worse than a predetermined state; and
a notifying unit ~~connected~~ coupled to said judging unit for notifying said transmission power control bit adjusting unit of said quality deterioration when said judging unit judges that said communication state is worse than said predetermined state.

10. (currently amended): A base station as claimed in Claim-9 6, wherein:
said ~~monitor unit~~ communication state monitor circuit, is connected to said receivers, ~~for monitoring~~ monitors total interference electric power of said demodulated signals as said communication state; and
said ~~judging unit~~ judging ~~judges~~ that said communication state is worse than said predetermined state when said total interference electric power is larger than a predetermined threshold.

11. (currently amended): A base station as claimed in Claim-9 6, wherein:
said ~~monitor~~ communication state monitor circuit, ~~is connected~~ coupled to said signal-to-noise ratio determining circuits, ~~instead of said receivers for periodically finding an average of~~ monitors said signal-to-noise ratios as said communication state; and

~~said judging unit judging judges~~ that said communication state is worse than said predetermined state when the number of signal-to-noise ratios, each of which is ~~larger~~ smaller than ~~the average~~ a predetermined value, is equal to or larger than a predetermined threshold.

12. (currently amended): A base station as claimed in Claim ~~9~~ 6, wherein:

said ~~monitor unit~~ communication state monitor circuit, ~~is connected~~ coupled to said transmission power control bit generators, ~~instead of said receivers for monitoring~~ monitors said transmission power control bit signals as said communication state, and

~~said judging unit judging judges~~ that said communication state is worse than said predetermine state when the number of said transmission power control bit signals, each of which require an increase of transmission power, is equal to or larger than a predetermined threshold.

13. (currently amended): A base station as claimed in Claim ~~9~~ 6, wherein:

said ~~monitor unit~~ communication state monitor circuit, ~~is connected~~ coupled to said receivers, ~~for monitoring~~ monitors total interference electric power of said demodulated signals and the number of said mobile terminals communicating with said base station as said communication state, and

~~said judging unit judging judges~~ that said communication state is worse than said predetermined state when a changing rate of a ratio of said total interference electric power to the

number of said mobile terminals communicating with said base station is equal to larger than a predetermined threshold.

14. (currently amended): A transmission power control system for use in a base station of a mobile communication system ~~to control transmission power of mobile stations by use of transmission power control bit signals~~, said base station including receivers for demodulating transmission signals transmitted from said mobile stations to produce demodulated signals, signal-to-noise ratio determining circuits ~~connected~~ coupled to said receivers, respectively, for determining signal-to-noise ratios of said demodulated signals and transmission power control bit generators connected to said signal-to-noise ratio determining circuits respectively for generating said transmission power control bit signals based ~~on the basis of~~ said signal-to-noise ratios, said transmission power control system comprising:

a communication state monitor circuit ~~connected~~ coupled to said receivers for detecting quality deterioration of a communication state of radio communication between said base station and said mobile stations; and

a transmission power bit adjusting circuit ~~connected~~ coupled to said ~~quality deterioration detector~~ communication state monitor circuit and said transmission power control bit generators for controlling said transmission power control bit signals so as to suppress an increase of transmission power of said mobile stations when said ~~quality deterioration detector~~ communication state monitor circuit detects said quality deterioration.

15. (currently amended): A transmission power control system as claimed in Claim

14, wherein:

said transmission power control bit generators ~~generating~~ generate said transmission power control bit signals which require an increase of transmission power of said mobile stations when said signal-to-noise ratios are equal to or lower than a desired value, ~~wherein;~~ and

said transmission power control bit adjusting ~~unit~~ circuit decreases said desired value to suppress an increase of transmission power of said mobile stations when said quality deterioration detector ~~communication state monitor circuit~~ detects said quality deterioration.

16. (currently amended): A transmission power control system as claimed in Claim

14, ~~wherein;~~ said transmission power control bit adjusting ~~unit~~ circuit changes said transmission power control bit signals so that said transmission power control bit signals require a decrease of said transmission power of said mobile stations.

17. (currently amended): A transmission power control system as claimed in Claim

14, wherein said communication state monitor circuit comprises:

a monitor unit for monitoring said communication state of said radio communication;

a judging unit ~~connected~~ coupled to said monitor unit for judging whether said communication state monitored by said monitor unit is worse than a predetermined state; ~~;~~ and

a notifying unit ~~connected~~ coupled to said judging unit for notifying said transmission power control bit adjusting unit of said quality deterioration when said judging unit judges that said communication state is worse than said predetermined state.

18. (currently amended): A transmission power control system as claimed in Claim 17, wherein:

said monitor unit, ~~is connected~~ coupled to said receivers, ~~for monitoring~~ monitors total interference electric power of said demodulated signals as said communication state,; and
said judging unit ~~judging~~ judges that said communication state is worse than said predetermined state when said total interference electric power is equal to or larger than a predetermined threshold.

19. (currently amended): A transmission power control system as claimed in Claim 17, wherein:

said monitor, ~~is connected~~ coupled to said signal-to-noise ratio determining circuits, ~~instead of said receivers for periodically finding an average of~~ monitors said signal-to-noise ratios as said communication state,; and
said judging unit ~~judging~~ judges that said communication state is worse than said predetermined state when the number of signal-to-noise ratios, each of which is ~~larger~~ smaller than ~~the average~~ a predetermined value, is equal to or larger than a predetermined threshold.

20. (currently amended): A transmission power control system as claimed in Claim 17, wherein:

said monitor unit, ~~is connected~~ coupled to said transmission power control bit generators, ~~instead of said receivers for monitoring~~ monitors said transmission power control bit signals as said communication state; and

said judging unit ~~judging~~ judges that said communication state is worse than said predetermine state when the number of said transmission power control bit signals, each of which require an increase of transmission power, is equal to or larger than a predetermined threshold.

21. (currently amended): A transmission power control system as claimed in Claim 17, wherein:

said monitor unit, ~~is connected~~ coupled to said receivers, ~~for monitoring~~ monitors total interference electric power of said demodulated signals and the number of said mobile terminals communicating with said base station as said communication state; and

said judging unit ~~judging~~ judges that said communication state is worse than said predetermined state when a changing rate of a ratio of said total interference electric power to the number of said mobile terminals communicating with said base station is equal to larger than a predetermined threshold.

22. (currently amended): A method of controlling transmission power of mobile stations from a base station of a mobile communication system, comprising the steps of:

monitoring, ~~with a monitor unit located in-at~~ said base station, a communication state of ~~said radio communication between said base station and said mobile stations;~~

judging, ~~with a judging unit connected to said monitor unit in-at~~ said base station, whether said monitored communication state ~~monitored at the monitoring step~~ is worse than a predetermined state; and

notifying, ~~from a notifying unit connected to said judging unit in~~ said base station, an external circuit of said quality deterioration when judgement that said communication state is judged to be worse than said predetermined state ~~is made at the judging step~~.

23. (currently amended): A method as claimed in Claim 22, ~~said base station having receivers for~~ comprising demodulating transmission signals transmitted from said mobile stations to produce demodulated signals, ~~said monitor unit connected to said receivers,~~ wherein:

~~the monitoring step is for monitoring~~ total interference electric power of said demodulated signals is monitored as said communication state; and

~~the judging step being for judging that~~ said communication state is judged to be worse than said predetermined state when said total interference electric power is equal to or larger than a predetermined threshold.

24. (currently amended): A method as claimed in Claim 22, ~~said base station having receivers for comprising~~ demodulating transmission signals transmitted from said mobile stations to produce demodulated signals and ~~signal-to-noise ratio determining circuits connected to said receivers respectively for~~ determining signal-to-noise ratios of said demodulated signals, ~~said monitor connected to said signal-to-noise ratio determining circuits,~~ wherein:

~~the said monitoring step is for~~ periodically ~~finding monitors~~ an average of said signal-to-noise ratios as said communication state; and

~~the judging step being for judging that said communication state is~~ judged to be worse than said predetermined state when the number of signal-to-noise ratios, each of which is ~~larger smaller than the average~~ a predetermined value, is equal to larger than a predetermined threshold.

25. (currently amended): A method as claimed in Claim 22, ~~said base station having receivers for comprising~~ demodulating transmission signals transmitted from said mobile stations to produce demodulated signals, ~~signal-to-noise ratio determining circuits connected to said receivers respectively for~~ determining signal-to-noise ratios of said demodulated signals and ~~transmission power control bit generators connected to said signal-to-noise ratio determining circuits respectively for~~ generating transmission power control bit signals on the basis of said signal-to-noise ratios, ~~said monitor unit connected to said transmission power control bit generators,~~ wherein:

~~the monitoring step is for monitoring said transmission power control bit signals~~ are monitored as said communication state; and

~~said judging unit being for judging that~~ said communication state is judged to be worse than said predetermine state when the number of said transmission power control bit signals, each of which require increase of transmission power, is equal to or larger than a predetermined threshold.

26. (currently amended): A method as claimed in Claim 22, ~~said base station having receivers for~~ comprising demodulating transmission signals transmitted from said mobile stations to produce demodulated signals, ~~said monitor unit connected to said receivers,~~ wherein:

~~the monitoring step is for monitoring~~ total interference electric power of said demodulated signals and the number of said mobile terminals communicating with said base station are monitored as said communication state; and

~~the judging step being for judging that~~ said communication state is judged to be worse than said predetermined state when a changing rate of a ratio of said total interference electric power to the number of said mobile terminals communicating with said base station is equal to or larger than a predetermined threshold.

27. (currently amended): A method of controlling transmission power of mobile stations of a mobile communication system by use of transmission power control bit signals transmitted from a base station, ~~said base station including receivers for~~ comprising:

demodulating transmission signals transmitted from said mobile stations to produce demodulated signals; ~~signal-to-noise ratio determining circuits connected to said receivers respectively for~~

determining signal-to-noise ratios of said demodulated signals; ~~and transmission power control bit generators connected to said signal-to-noise ratio determining circuits respectively for~~

generating said transmission power control bit signals on the basis of said signal-to-noise ratios; ~~comprising the steps of:~~

detecting, ~~with a communication state monitor circuit at~~ said base station, quality deterioration of a communication state of radio communication between said base station and said mobile stations; ~~and~~

controlling, ~~with a transmission power control bit adjusting circuit connected to said communication state monitor circuit and said transmission power control bit generators at said base station~~, said transmission power control bit signals so as to suppress an increase of transmission power of said mobile stations when said quality deterioration is detected ~~at the detecting step~~.

28. (currently amended): A method as claimed in Claim 27, ~~said transmission power control bit generators generating~~ wherein said transmission power control bit signals, which require an increase of transmission power of said mobile stations, are generated when said signal-to-noise ratios are lower than a desired value, ~~wherein: and~~

~~the controlling step is for decreasing said desired value~~ is decreased to suppress an increase of transmission power of said mobile stations when said quality deterioration is detected ~~at the detecting step.~~

29. (currently amended): A method as claimed in Claim 27, wherein:

~~the controlling step is for changing said transmission power control bit signals~~ are changed so that said transmission power control bit signals require a decrease of said transmission power of said mobile stations.

30. (currently amended): A method as claimed in Claim 27, wherein ~~the detecting step comprises the steps of:~~

monitoring, ~~with a monitor unit,~~ said communication state of said radio communication;
judging, ~~with a judging unit connected to said monitor unit,~~ whether said monitored communication state ~~monitored at the monitoring step~~ is worse than a predetermined state; ~~and~~
notifying, ~~from a notifying unit connected to said judging unit,~~ said transmission power control bit adjusting unit of said quality deterioration when judgement that said communication state is judged to be worse than said predetermined state ~~is made at the judging step.~~

31. (currently amended): A method as claimed in Claim 27, ~~said monitor unit~~
~~connected to said receivers,~~ wherein:

the ~~monitoring step is for monitoring~~ total interference electric power of said
demodulated signals is monitored as said communication state; and

the ~~judging step being for judging that~~ said communication state is judged to be worse
than said predetermined state when said total interference electric power is equal to or larger than
a predetermined threshold.

32. (currently amended): A method as claimed in Claim 27, ~~said monitor unit~~
~~connected to said signal to noise ratio determining circuits,~~ wherein:

the said monitoring step is for periodically finding an average monitors each of said
signal-to-noise ratios as said communication state; and

the ~~judging step being for judging that~~ said communication state is judged to be worse
than said predetermined state when the number of signal-to-noise ratios, each of which is ~~larger~~
smaller than the average a predetermined value, is equal to or larger than a predetermined
threshold.

33. (currently amended): A method as claimed in Claim 27, ~~said monitor unit~~
~~connected to said transmission power control bit generators,~~ wherein:

the ~~monitoring step is for monitoring~~ said transmission power control bit signals are
monitored as said communication state; and

~~the judging step being for judging that~~ said communication state is judged to be worse than said ~~predetermine~~ predetermined state when the number of said transmission power control bit signals, each of which require an increase of transmission power, is equal to larger than a predetermined threshold.

34. (currently amended): A method as claimed in Claim 27, ~~said monitor unit is connected to said receivers, wherein:~~

~~the monitoring step if for monitoring~~ total interference electric power of said demodulated signals and the number of said mobile terminals communicating with said base station are monitored as said communication state; and

~~the judging step being for judging that~~ said communication state is judged to be worse than said predetermined state when a changing rate of a ratio of said total interference electric power to the number of said mobile terminals communicating with said base station is equal to or larger than a predetermined threshold.

35. (new): A base station in a mobile communication system comprising:

a receiver which demodulates transmission signals transmitted from plural mobile stations;

a communication state monitor, coupled to said receiver, which detects a deterioration of a communication state of radio communication between said base station and the plural mobile stations;

a transmission power control signal adjusting circuit, coupled to said communication state monitor, which controls transmission power control signals so as to decrease the transmission power of the plural mobile stations if said communication state monitor detects the deterioration; and

a transmitter, coupled to said transmission power control signal adjusting circuit, which transmits the transmission power control signals to the plural mobile stations.

36. (new): A base station according to claim 35, wherein, said communication state monitor monitors an interference power of the transmission signals received by said receiver, and detects the deterioration of the communication state based on the interference power.

37. (new): A mobile station among plural mobile stations, in a mobile communication system, comprising:

a transmitter which transmits a signal to a base station;

a receiver which receives, from the base station, a transmission power control signal directing to decrease a power of the signal to be transmitted to the base station in the case where a deterioration of a communication state of radio communication between the base station and the plural mobile stations is detected at the base station; and

a transmission power controller which decides a transmission power of the signal to be transmitted to the base station based on the transmission power control signal.

38. (new): A mobile station according to claim 37, wherein, the deterioration of the communication state is detected based on an interference power of transmission signals, from the plural mobile stations, received by the base station.

39. (new): A mobile communication system comprising a base station and plural mobile stations, wherein said base station comprises:

a receiver which demodulates transmission signals transmitted from said plural mobile stations;

a communication state monitor, coupled to said receiver, which detects a deterioration of a communication state of radio communication between said base station and said plural mobile stations;

a transmission power control signal adjusting circuit, coupled to said communication state monitor, which controls transmission power control signals so as to decrease the transmission power of said plural mobile stations if said communication state monitor detects the deterioration; and

a transmitter, coupled to said transmission power control signal adjusting circuit, which transmits the transmission power control signals to the plural mobile stations, and

each of said mobile stations comprises:

a transmitter which transmits a signal to said base station;

a receiver which receives one of the transmission power control signals from the base station; and

a transmission power controller which decides a transmission power of the signal to be transmitted to said base station based on the transmission power control signal received by said receiver.

40. (new): A method, for a mobile communication system comprising a base station and plural mobile stations, comprising:

demodulating transmission signals transmitted from the plural mobile stations;

detecting, at the base station, a deterioration of a communication state of radio communication between said base station and the plural mobile stations;

controlling, at the base station, power control signals so as to decrease the transmission power of the plural mobile stations if said communication state monitor detects the deterioration; and

transmitting the transmission power control signals to the plural mobile stations.

41. (new): A method, for a mobile communication system comprising a base station and plural mobile stations, comprising:

transmitting a signal to the base station;

receiving, from the base station, a transmission power control signal directing to decrease a power of the signal to be transmitted to the base station in the case where a deterioration of a communication state of radio communication between the base station and the plural mobile stations is detected at the base station; and

deciding a transmission power of the signal to be transmitted to the base station based on the transmission power control signal.

42. (new): A method for a mobile communication system, comprising a base station and plural mobile stations, comprising:

demodulating transmission signals transmitted from the plural mobile stations;

detecting, at the base station, a deterioration of a communication state of radio communication between said base station and the plural mobile stations;

controlling, at the base station, transmission power control signals so as to decrease the transmission power of the plural mobile stations if said communication state monitor detects the deterioration;

transmitting the transmission power control signals to the plural mobile stations;

transmitting a signal to the base station;

receiving one of the transmission power control signals from the base station; and

AMENDMENT UNDER 37 C.F.R. §1.111
USSN: 09/924,723

deciding a transmission power of the signal to be transmitted to the base station based on the transmission power control signal received.